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Notes on Drought Reactions of Some Newer Varieties.

By W. J. S. SLOAN.

OVERALL, the season 1945-46 was a very poor one in the sugar growing districts. The drought which set in during the end of that season carried right through the remainder of 1946 and was not broken till early 1947. In many mill areas where the success or failure of the cane crop depends on rainfall, 1946 was one of the worst years on record. In the central and southern districts the severe winter made conditions for cane growing even more harsh and the complete abandonment of fields because the cane was unsuitable for milling, was not uncommon.

Land over a large area could not be properly prepared for planting because of inadequate soil misture, and planting was done frequently in soils of poor tilth. Likewise ratooning presented many difficulties. An observation of interest was the fact that in a number of instances cane which had been well fertilized when young or which was growing on patches of silt of good fertility deteriorated rapidly during the drought and crops of up to 35 tons per acre were unfit for milling. This was noted particularly with the variety P.O.J.2878 in the southern districts, but poor germination and growth in silty patches of ground were also seen in other districts in other varieties. The explanation appears to be bound up with the extent of growth of the crop and the moisture-holding capacity of the soil. Where early growth was forced by fertilizers on soils of low moisture-holding capacity, the soil moisture was quite inadequate to meet the demands made by the big plants during the drought and the cane stalks died. Likewise in silty patches of soil, where usually heavy yielding cane grows, the cane died during the drought, while less well-grown cane on the hillsides was harvestable.

The drought of 1946 provided a severe test for varieties and the following notes on the drought resistance of some of the newer varieties have been compiled for the information of growers.

Trojan.—In northern Queensland this variety germinated very well under dry soil conditions. Setts appear to possess the ability to lie dormant in dry soil for a long period and still give a good strike following even light showers of rain. In view of its comparatively slow early growth it can be assumed that Trojan makes less demand on soil moisture early than other quicker growing varieties, thus it can survive

and progress during the spring and early summer when soil moisture is normally low. Moreover, young plants have a moderately sparse top and moisture loss by transpiration from the leaves is probably lower than with most other canes. A deep rooting system enables it to tap sub-soil moisture.

The stooling of 1946 autumn plant was only fair but later planted cane recovered well after the drought and stooled strongly following the early 1947 rains. For the most part Trojan ratooned satisfactorily under dry conditions.

In the central district the variety gave a good all-round performance on soils of high fertility and in standing crops deterioration in the stalk during the drought was less than in Q.28 and Q.50. Growth on the soils of low fertility, however, was not impressive.

In general the drought resistance of Trojan, especially in plant crops, was very satisfactory under northern conditions. Ratoons on poorer class soils which do not hold moisture well were less attractive. Under harsh conditions cover in ratoon crops particularly was weak.

Cato.—Germinations in this variety were superior to all other varieties on the approved lists in northern districts. The strike was quick and early but the plants suffered severely from drought and much dead leaf was in evidence. An exceptionally good recovery was made following rain, its capacity for late growth being a characteristic of this variety.

On the better-class soils where soil moisture was fair Cato ratooned well, but on the less fertile drier soils the ratoons were very patchy.

Eros.—Normally this cane is a slow striker and with low soil moisture strikes were even slower and more irregular. Like Trojan its comparatively slow early growth favours survival of the cane when soil moisture is low. Plants recovered well and made excellent growth following rain. It is a vigorous ratooner and in several instances observed it was distinctly superior to Trojan in this respect. Standing crops showed some pithiness and the development of stem rots was also noted.

Comus.—This cane germinated well under dry conditions but the young plants were among the first to show distress, although leaf sheaths remained green. In the Mackay area germinations from pithy and red rot infected plants were surprisingly good where soil moisture was fair. For the most part ratoons were poor and cases of complete failure were noted at Mackay. On the other hand at Mossman where soil moisture in some fields was better, Comus ratoons were superior to those of Trojan. Both plant and ratoons responded well after relief rains.

In standing crops pithiness developed in sticks followed later by piping which extended from the butt to the wilted top growth and by harvest many dead sticks were present. At Mackay red rot was prevalent in the variety.

Q.28.—Plants for the spring planting at Mackay were in the main of inferior standard and germinations were patchy in many fields with low soil moisture. Where sufficient soil moisture was present, however, germinations from this planting material were surprisingly good. In general Q.28 resisted drought much better than a number of the older varieties but its performance was not outstanding. Although the foliage

wilted the leaf sheath remained green. Cane stalks became pithy and deteriorated further with the continued dry weather. By the commencement of harvesting in August at Mackay there was a large percentage of dead sticks per stool and red rot was prevalent.

Ratooning under dry conditions was very patchy and almost complete failures occurred in some fields. Both plant and ratoons responded well after rain and came away quickly. In the southern districts the performance of Q.28 was satisfactory and better than a number of the standard varieties.

Q.42.—Although this variety is not a strong germinator, plantings in the southern districts—the only areas in which it is used—gave fair strikes under low soil moisture conditions in 1946. Young plant cane and standing crops appeared to withstand drought better than any other variety on the approved lists in the southern districts. Despite the harsh circumstances several fields were observed to maintain a green colour up to the time of harvesting in November. Condition of the stalks at harvesting was good and little infection with stem rots was recorded.

Q.42 is not a good ratooner but ratooning in general was fair during the drought.

Q.44.—In northern districts germination failures were not uncommon when planted late under very dry conditions in 1946. This variety seems to require good soil tilth and light cover for satisfactory strikes in cool weather. It is an early and fast germinator under suitable conditions, making rapid early growth. The young plants therefore make bigger demands on soil moisture in the early stages than is the case with most other varieties. During the 1946 drought it suffered extensive leaf damage and death of stools occurred in some instances towards the end of the dry spell. Q.44 is a vigorous ratooner and it ratooned remarkably well under dry conditions on different soil types.

Both plant and ratoons responded quickly after rain. The best performance of this variety was on the low lands in the northern districts where soil moisture was not depleted to the same extent as on the slopes. Propagation of Q.44 is only in the early stages in other districts. In a few plots at Mackay it was not outstanding but germination was surprisingly good considering that the plants were of a poor type and soil tilth was unfavourable.

Q.45.—The use of this variety is confined to the central district. Plants used in 1946 were of an inferior type but strikes were fair and above average for the season. Growing crops showed distress early but where not frosted the sticks did not deteriorate greatly. The percentage of dead sticks at harvest was well below the average for other varieties.

Ratoons were good for dry conditions. Both plant and ratoons made rapid progress after the early 1947 rains. In general, Q.45 resisted drought in the Mackay area nearly as well as P.O.J.2878 and P.O.J.2725, which gave the best performance of the well-known canes on the approved lists.

Q.47.—Germinations with this variety were only about average and in general inferior to Q.49. Ratoons were good in the circumstances and stem rots were not very noticeable in standing crops at harvest. Both plant and ratoons responded readily after the rains.

Q.49.—This variety normally germinates and ratoons well and under dry soil conditions gave a good average performance. Growth in both plant and ratoons was rapid after rains. Red rot tended to develop in stalks of standing crops during the drought.

Q.50.—This variety is confined mainly to the central districts and only experimental plantings have been made in other areas. Germinations under low soil-moisture conditions were above average even when the plants were pithy and infected with red rot. Young plants withstood dry weather extremely well and made progress despite low soil moisture. Ratooning also was very satisfactory under harsh conditions. Recovery was quick in both plant and ratoons following rain.

In standing crops at harvest, however, the stalks were pithy and red rot was prevalent in a number of cases. Dead stalks were also present, but over-all sugar content was surprisingly good.

C.P.29/116.—In the southern districts, where this variety is chiefly grown, it gave a very good performance during the drought. In the 1946 spring planting, plants of this variety were superior to all save Q.42 and strikes were exceptionally good under the prevailing harsh conditions. With its excellent striking and ratooning habits, C.P.29/116, planted where it will not be affected by early frosts, has proved to be a very suitable cane for the medium and poorer soils particularly.

Raggedness of the foliage was visible early in established plants, but subsequent deterioration was less than in other varieties and cane was in a reasonably good state when harvested, in sharp contrast to Co.290 which was severely affected with red rot. Where the cane was not frosted during the 1946 drought, sugar content was satisfactory when the cane was milled.

Frost Resistance of New Varieties in Central and Southern Queensland.

By W. J. S. SLOAN.

THE cold winter of 1946 showed up sharply the different reactions of varieties towards frost damage. Growers, for the most part, are familiar with the way older varieties react but the behaviour of some of the newer varieties is less well known and it is considered that it would be informative to place on record observations made on them during the winter of 1946.

In a number of localities in the Mackay and Proserpine areas, damage from frosts in late July or early August is not unexpected but the effect is combated to a certain extent by the fact that crops so damaged can be harvested quickly and milled. However, in 1946, cold conditions occurred much earlier than usual, with frosts on nine successive nights in early June. The damage was widespread and included cane lands never affected previously. Individual frosts were not of record severity but the period of successive frosts on cane which was already suffering from a bad growth check as a result of drought, even affected varieties such as P.O.P.2878 which has previously shown a

fair tolerance to frost in the Mackay area. Further frosts in late July and early August accentuated deterioration of the cane. The frosts damaged the cane when it was immature, and low C.C.S. returns were characteristic of frosted cane when harvested.

In the Moreton area, also, the winter was severe and several districts previously untouched were affected. As at Mackay, cane at the time was suffering from low soil-moisture conditions with the result that varieties were subjected to a severe test. The worst frosts occurred in early July, following several weeks of light frosts, and caused extensive damage.

Seasonal conditions appear to exert a considerable influence on the tolerance of varieties to frost damage and doubtless in 1946 drought was an important factor in the reaction of varieties. Had soil moisture been good it is possible that frost injury would have been much less extensive. Notes on the reactions of varieties are as follows:—

Q.28.—At Mackay the impression gained early in the winter was that this variety was resisting frost exceptionally well but later, close examination showed that this was not true and actually its frost resistance was judged to be no better than Badila, E.K.28 and H.Q.426. On the higher or marginal frost lands not normally susceptible to damage, the leaf sheaths of Q.28 remained green and healthy in contrast to E.K.28, M.1900 Seedling and Q.45 which were completely brown with the growing points dead. However, inspection of the actual growing

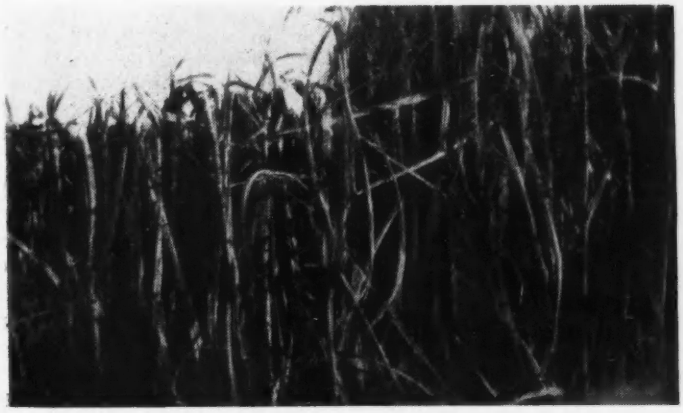

FIG. 41.—Comparison of M.1900 and Q.28 on the marginal lands at Mackay. The M.1900 is completely dead at the growing point and is showing side shoots, while Q.28 nearby remained green but for the heart.

point or heart of Q.28 showed that this too was dead and further growth was no more possible than was the case with the other varieties, despite its apparent better condition. Q.28 did show superiority in that fewer eyes on the stalk were damaged and its deterioration was less rapid than other varieties on the marginal frost areas.

In the Moreton area, the performance of Q.28 was encouraging. In contrast to the experience at Mackay, early damage was less than appearances indicated, the older leaves being browned easily whilst

those near the spindle remained green for up to two severe frosts. The growing point and top eyes were quite sound on stalks which showed 80 per cent. death of tops. It was noted with this variety that where it was planted at an interspace of four feet six inches or less the resultant body of foliage often protected the crop from serious damage. In harvested trials, Q.28 was equal to or only slightly inferior to Q.42 which is generally accepted as the most frost-resistant of the current varieties in the Moreton area, but was definitely superior to Co.290 and C.P.29/116. Its recovery in the spring from frost injury was very good and better than expected.

Q.50.—This cane is a seedling bred by the Bureau from the cross P.O.J.2725 x Co.290 and has shown outstanding promise in the Mackay area. In 1947 it was added to the approved variety lists for all mill areas at Mackay; at the same time it has been propagated in a number of other mill areas, where its suitability for these districts is being evaluated. Although there were few plots of this variety in frost-affected areas at Mackay, general observations suggested that its frost resistance was fair.

Trojan.—It is too early yet to state definitely the reaction of this variety to frost in the areas normally susceptible to injury. However, in the few fields exposed to frost in the Mackay area it withstood damage very well. Leaves were slightly browned off but the growing point and eyes were unharmed although adjacent Badila, E.K.28 and Q.45 suffered considerably.

In the Moreton area results were not so satisfactory. On the less fertile soils the cane did not make good growth and early light frosts caused extensive banded sclerosis in the leaves. The severe frosts of early July burnt all foliage, killing the growing point and lower eyes. Indications, however, were that frosted Trojan did not deteriorate as rapidly as some other varieties.

Q.45.—This variety proved to be very susceptible to frost. At Mackay it suffered severely on the low lands and showed injury as early as E.K.28 and deteriorated more quickly. In the Moreton area, its extreme susceptibility was so obvious that it has been eliminated from further trials in that area.

Q.42.—This variety was planted in the Moreton area in fields which are regularly subjected to frost because experience over several years has emphasized its hardiness compared to other varieties. In trials it performed very well. Yields in tons of cane per acre were inferior to other varieties but because of its better sugar content early when damaging frosts occurred, the net monetary return from Q.42 was higher than from the remaining varieties which included C.P.29/116 and Co.290. Q.42 is an early maturer, and in the Moreton area particularly it has proved to be more resistant to extremes of cold than any of the standard varieties. Its disadvantages are that ratooning is sometimes weak, it is a hard-cutting cane and is very susceptible to mosaic disease.

C.P.29/116.—This is a late maturing variety which makes vigorous growth and because of its many desirable qualities it was planted extensively in the Moreton area in 1945. Unfortunately, the crops were frosted in 1946 when about 10 months of age only and sugar content

was low. In some cases sugar was so low that the crop was not millable. The top is hardy and the variety retained colour in the central leaves when other varieties were brown and dead. However, when the stalks were split it was seen that internal injury was extensive. Because of its late maturing habit and its susceptibility to frost, care should be taken to plant this variety where it will not be damaged by early frosts.

Generally it shows greater resistance to frost than P.O.J.2878 in the southern districts and this was noted particularly on several farms in the Maryborough mill area in 1946.

FIG. 42.—Illustrating the effect of frost on P.O.J.2878 in the Pialba area in 1946. The tops were killed and extensive side shooting developed from the upper buds.

In general, experience at Mackay during 1946 may be summarized thus: The varieties Badila, Co.290, Comus, E.K.28, H.Q.426, M.1900 Seedling, Q.28, Q.45, and S.J.2 all suffered severely from frost on the low country; P.O.J.2878 and Trojan were the most tolerant; on the higher lands and those lands not usually affected over a period of years, Q.28 is the most suitable variety, although the rapidly expanding Q.50 may be expected to take its place in many fields.

In the Moreton area Q.42 gave the best performance in frosted areas, closely followed by Q.28.

Varietal Trials, 1947 Season.

By NORMAN J. KING.

IN the January, 1947, Quarterly Bulletin we were able to publish results of some variety trials which were the first harvested since the war. The return from military service of field staff has allowed the recommencement of this important work after a break of a few years, when only a skeleton extension staff was available. The 1946 planting season was availed of to plant a good number of trials in all districts, but the disastrous drought which affected most areas had a detrimental effect on farm trial plantings and several have had to be discarded owing to lack of normal growth. Results in such a year cannot be correctly assessed and trials grown under such conditions cannot be expected to give any more than a general indication of crop production under harsh conditions.

In the far north the season was abnormal in many respects, principally in regard to the restricted wet season, but late rains compensated to some extent in producing further growth. The Burdekin area was less affected by deficiencies in rainfall as this was made up by irrigation, but the Proserpine and Mackay areas suffered one of the worst droughts on record for those parts of the State. South Queensland districts had a much better than average wet season and crops in that division approximated in most cases to peak proportions.

Trojan and Eros performed well in Northern trials, but the former variety was not impressive in Mackay, when Q.50 demonstrated its superiority. Q.44 was also not up to expectations in the Central district. In the South C.P.29/116 gave remarkably good yields, while Q.47 and Q.49 also produced some good crops. P.O.J.2878 and Co.290, two old favourites, were beaten in several trials by the newer varieties. Co.301, a newcomer in our field trials, produced an excellent crop, but had low sugar.

Acknowledgement is made to Fairymead Sugar Co. for permission to use the results of several trials carried out on their plantations.

Mr. P. Garrone's Farm, Mourilyan.

Soil Type.—Schist loam. **Nature of Crop.**—First ratoon.

Age of Crop.—12½ months. **Harvested.**—August, 1947.

SUMMARY OF CROP YIELDS.

Variety.	Plant Cane.		First Ratoon.		Summary.	
	Cane per acre.	C.C.S.in cane.	Cane per acre.	C.C.S. in cane.	Total Crop.	Average C.C.S.
	Tons.	Per cent.	Tons.	Per cent.	Tons.	Per cent.
Eros	19·7	16·1	19·2	14·8	**38·9**	**15·45**
32–8560 ..	11·4	15·6	16·6	14·2	25·6	14·90
Badila ..	15·9	16·3	15·3	14·5	31·2	15·40

DISCUSSION.

Eros and Badila ratooned well but 32-8560 was patchy and slow. By December, 1946, the latter variety had a poor stand and the growth and general appearance were not impressive. Eros and Badila were showing up well but owing to the dry conditions prevailing there was no vigorous growth in either variety. With the advent of the wet season 32-8560 grew well and developed a good cover to such an extent that at harvesting in August this variety was free of weed growth although Eros and Badila were infested with blue-top. Eros arrowed badly prior to harvest. In the summary of the plant and first ratoon crops Eros performed best both in cane tonnage and in sugar content while Badila was superior to 32-8560. The hard cutting of 32-8560 also militates against its being considered as a desirable variety.

Mr. H. Ivers's Farm, Rosella, Mackay.

Soil Type.—Forest sandy loam. **Nature of Crop.**—First Ratoon.
Age of Crop.—12 months. **Harvested.**—October, 1947.

SUMMARY OF CROP YIELDS.

Variety.	Plant Cane.		First Ratoon.		Summary.	
	Cane per acre.	C.C.S. in cane.	Cane per acre.	C.C.S. in cane.	Total Crop.	Average C.C.S.
	Tons.	Per cent.	Tons.	Per cent.	Tons.	Per cent.
Q.50	35·7	14·8	18·8	16·1	**54·5**	**15·45**
A.130 ..	32·0	11·3	15·8	14·4	47·8	12·85
A.147	25·1	14·7	13·2	15·8	38·3	15·25
Trojan ..	26·4	13·5	No harvestable crop		..	..
Q.28 ..	21·9	13·7	No harvestable crop		..	..

DISCUSSION.

After the harvesting of the plant crop Q.50, A.130, and A.147 ratooned well but Trojan and Q.28 were slow and erratic. The plant cane had gone through a severe drought and the dry conditions at harvesting probably had an effect on the resultant ratoons. When Trojan did ratoon it failed to maintain growth and did not make a harvestable crop. The Q.28 obviously suffered from the unidentified trouble which effects this variety in some ratoon crops and also failed to maintain normal growth. In the aggregate of the two crops Q.50 gave the best performance in both tonnage of cane and sugar per acre while A.130 was slightly superior to A.147. The results of this trial cannot be accepted as a normal comparison of these varieties owing to the effects of severe drought conditions.

Mr. W. Truscott's Farm, Bundaberg.

Soil Type.—Forest red sandy loam. **Nature of Crop.**—First ratoon.
Age of Crop.—12 months. **Harvested.**—November, 1947.

SUMMARY OF CROP YIELDS.

Variety.	Plant Crop.		First Ratoon.		Summary.	
	Cane per Acre.	C.C.S. in Cane.	Cane per Acre.	C.C.S. in Cane.	Total Crop.	Average C.C.S.
	Tons.	Per cent.	Tons.	Per cent.	Tons.	Per cent.
Q.49	22·6	16·1	34·9	14·1	**57·5**	**15·1**
Q.47	22·6	14·9	32·5	14·9	55·1	14·9
Q.48	22·1	14·1	28·7	14·4	50·8	14·3
P.O.J.2878 ..	21·1	10·0	27·7	15·3	48·8	12·7

DISCUSSION.

Ratooning after the plant crop was good, the order of early showing being Q.48, Q.47, Q.49, and P.O.J.2878. Q.47 developed the best stool in the early stages although Q.48 was taller. After the February rains there were no apparent differences and all were growing strongly. Prior to harvest there were no great differences visible between any of the varieties, but the weights indicated that Q.49 and Q.47 had a good lead. The two crops indicate the superiority of Q.49 and Q.47 on this soil type under irrigated conditions. The low average C.C.S. of P.O.J.2878 was brought about by severe frosting of the plant crop.

Fairymead Sugar Co., Hapsburg Plantation.

BLOCK 5.

Soil Type.—Red volcanic loam.
Nature of Crop.—First ratoon.
Age of Crop.—13 months.
Harvested.—November, 1947.

SUMMARY OF CROP YIELDS.

Variety.	Cane per Acre.	C.C.S. in Cane.	Sugar per Acre.
	Tons.	Per cent.	Tons.
Co.301	**33.0**	11·9	**3.93**
Q.28	25·3	13·3	3·36
Q.47	22·9	14·5	3·32
Q.49	21·5	13·0	2·79
Q.25	20·2	**15.9**	3·21
Q.48	19·0	13·6	2·58

DISCUSSION.

All varieties except Q.25 and Q.48 ratooned strongly. These two were rather patchy and the stand which ultimately developed was not satisfactory. The new Co.301 performed very well in growth, but its low sugar may be a limiting factor in its becoming a commercial cane. Q.28 yielded well although its C.C.S. was low for so late in the season; despite this the sugar per acre was good and second only to Co.301. Q.47 gave a very favourable return, but Q.49 was rather disappointing.

Fairymead Plantation, Block 26E.

Soil Type.—Grey clay loam.
Nature of Crop.—Plant cane.
Age of Crop.—12 months.
Harvested.—September, 1947.

SUMMARY OF CROP YIELDS.

Variety.	Cane per Acre.	C.C.S. in Cane.	Sugar per Acre.
	Tons.	Per cent.	Tons.
C.P.29/116	**44.6**	11·8	5·26
Q.28	44·0	**12.8**	**5.63**
Q.52	41·7	11·5	4·97
Co.290	38·7	11·4	4·41

DISCUSSION.

Germinations were good in this trial and all varieties established a good, thick stand of cane. In the early stages of growth and up to six months of age the Q.52 had a good lead on all other varieties. In late autumn and winter months, however, its growth slowed down and allowed C.P.29/116

and Q.28 to overtake it. C.P.29/116 performs very well on these heavy soils although its sugar content is not so high as on other types. Q.28 put up a very good performance and its production of 5.6 tons of sugar per acre in twelve months makes it worthy of extended planting under these conditions.

Fairymead Plantation, Block 3.W., Trial No. 1.

Soil Type.—Grey clay loam. **Nature of Crop.**—First ratoon.
Age of Crop.—12 months. **Harvested.**—September, 1947.

SUMMARY OF CROP YIELDS.

Variety.	Plant Crop.		First Ratoon.		Summary.	
	Cane per Acre.	C.C.S. in Cane.	Cane per Acre.	C.C.S. in Cane.	Total Crop.	Average C.C.S.
	Tons.	Per cent.	Tons.	Per cent.	Tons.	Per cent.
C.P.29/116 ..	39·3	11·2	46·7	12·2	**86.0**	11·7
Q.48	34·7	10·9	41·9	11·2	76·6	11·1
Co.290 ..	33·1	12·3	37·7	12·0	70·8	12·2
Q.49	34·1	13·0	36·0	12·9	70·1	13·0
Q.25	35·6	13·5	34·6	13·6	70.2	**13·6**

DISCUSSION.

All varieties came away well after ratooning and C.P.29/116 did not establish a noticeable lead until after the wet season rains. The rather early harvesting was against good sugar content, but Q.25 once more exhibited its capacity to perform well in this way, and despite its lower cane yield it was in second place with tons of sugar per acre. In the aggregate of the two crops C.P.29/116 and Q.25 took first and second places in tons of sugar produced, with Q.49 next. Q.25 unfortunately is susceptible to Fiji disease and is also an erratic ratooner so that its value as a commercial variety is discounted somewhat.

Fairymead Plantation, Block 3.W., Trial No. 2.

Soil Type.—Grey clay loam. **Nature of Crop.**—First ratoon.
Age of Crop.—11 months. **Harvested.**—August, 1947.

SUMMARY OF CROP YIELDS.

Variety.	Plant Crop.		First Ratoon.		Summary.	
	Cane per Acre.	C.C.S. in Cane.	Cane per Acre.	C.C.S. in Cane.	Total Crop.	Average C.C.S.
	Tons.	Per cent.	Tons.	Per cent.	Tons.	Per cent.
C.P.29/116 ..	35·5	11·7	47·9	11·4	**83·4**	11·6
Q.48	32·5	10·9	39·1	11·5	71·6	11·2
Q.49	32·3	11·7	36·9	12·8	69·2	12·3
Q.47	31·9	13·6	35·1	14·4	67·0	**14.0**
Co.290 ..	31·8	11·6	34·9	11·3	66·7	11·5
Q.25	31·5	13·6	34·5	13·2	66·0	13·4

DISCUSSION.

After harvesting the plant crop all varieties except Q.25 came away well. This latter variety was rather patchy and the unsatisfactory stand is reflected in the yield. In the aggregate of the two crops C.P.29/116 produced 9.67 tons of sugar per acre and outyielded all other varieties. Q.47 was second and Q.25 just beat Q.49 in third place. The Fiji disease resistance of Q.47 and Q.49 makes them very promising varieties for Bundaberg conditions, particularly as both will stand over.

DISPERSED VARIETY TRIALS.

A new method of laying out variety trials has been attempted in certain districts during the past year. The usual procedure, whereby a complete trial is placed on one farm suffers from various disadvantages of which the principle ones are (a) the disinclination of growers in general to plant a full scale trial, and (b) the fact that the results from such a trial are true only for the conditions of the one location. It was decided to split up a full trial into three or four portions so that instead of having six or eight repetitions of each variety on the one farm we would have two repetitions on each of three or four farms. In other words the trial would be divided into three or four parts and each part would be planted on a separate farm. In this way it was hoped that the results could be, with some justification, taken as the average performance of the varieties over a sub-district, or over a soil type. The results shown below are the first obtained from this form of trial and some time will be required to assess the value of this departure as compared with the standard full-scale trial on a single farm.

Mr. M. Darveniza's Farm, South Johnstone.

Soil Type.—Red volcanic. **Nature of Crop.**—Plant Cane.
Age of Crop.—17 months. **Harvested.**—October, 1947.

SUMMARY OF CROP YIELDS.

Variety.	Cane per acre.	C.C.S. in Cane.
	Tons.	Per cent.
S.J.4	**34·4**	14·4
Q.54	30·3	15·5
Badila	28·3	**16·0**

Mr. J. Seres's Farm, Mourilyan.

Soil Type.—Schist loam. **Nature of Crop.**—Plant Cane.
Age of Crop.—15 months. **Harvested.**—September, 1947.

SUMMARY OF CROP YIELDS.

Variety.	Cane per acre.	C.C.S. in Cane.
	Tons.	Per cent.
S.J.4	**23·0**	12·7
Badila	18·0	**14·8**
Q.54	16·5	14·7

Mr. W. J. Henderson's Farm, South Johnstone.

Soil Type.—Red volcanic. **Nature of Crop.**—Plant cane.
Age of Crop.—14 months. **Harvested.**—July, 1947.

SUMMARY OF CROP YIELDS.

Variety.	Cane per acre.	C.C.S. in Cane.
	Tons.	Per cent.
S.J.4	**25·0**	13·3
Q.54	22·7	15·1
Badila	16·1	**15·4**

F. Biletta & Co.'s Farm, Moresby.

Soil Type.—Schist loam. **Nature of Crop.**—Plant cane.
Age of Crop.—18 months. **Harvested.**—November, 1947.

SUMMARY OF CROP YIELDS.

Variety.	Cane per Acre.	C.C.S. in Cane.
	Tons.	Per cent.
S.J.4.	29·1	15·1
Badila	18·2	15·8
Q.54	14·4	14·4

SUMMARY OF RESULTS ON FOUR FARMS.

Variety.	Average Cane per acre.	Average C.C.S. in Cane.	Average Tons Sugar per acre.
	Tons.	Per cent.	
S.J.4	27·9	13·8	3·87
Q.54	21·0	14·9	3·14
Badila	20·2	15·8	3·13

DISCUSSION.

In the trials above S.J.4 and Badila both gave excellent germinations but Q.54 was slower and not so good a strike. In general the early development was better with S.J.4 and Badila but during the dry summer Q.54 withstood the drought conditions the best of the three. During the wet season the Q.54 made better growth and succeeded in outyielding Badila in two of the four trials. At harvest time the S.J.4 was well ahead, and despite the lower sugar content it succeeded in giving the highest yield of sugar per acre, with Q.54 in second place.

Mr. G. Fowler's Farm, Home Hill.

Soil Type.—Alluvial loam. **Nature of Crop.**—Plant cane.
Age of Crop.—16 months. **Harvested.**—September, 1947.

SUMMARY OF CROP YIELDS.

Variety.	Cane per acre.	C.C.S. in Cane.
	Tons.	Per cent.
E.K.28	**63·0**	14·2
Trojan	61·1	**16·8**
Badila	57·3	14·8

Mr. W. F. Klaka's Farm, Home Hill.

Soil Type.—Sandy alluvial loam. **Nature of Crop.**—Plant cane.
Age of Crop.—16 months. **Harvested.**—September, 1947.

SUMMARY OF CROP YIELDS.

Variety.	Cane per acre.	C.C.S. in Cane.
	Tons.	Per cent.
Trojan	**59.3**	16·9
E.K. 28	56·5	15·8
Badila	45·3	**17·0**

SUMMARY OF RESULTS ON TWO FARMS.

Variety.	Average Cane per acre.	Average C.C.S. in Cane.	Average Tons Sugar per acre.
	Tons.	Per cent.	
Trojan	**60·2**	**16·85**	**10·14**
E.K.28	59·8	15·00	8·97
Badila	51·3	15·90	8·16

DISCUSSION.

A summary of these two trials which included the same three varieties indicates that Trojan outyielded E.K.28 by less than half a ton per acre, but that both Trojan and E.K.28 were superior to Badila. In tons of sugar per acre Trojan was the heaviest producer of the three while E.K.28 was better than Badila. Good germinations were obtained in both trials, and the early growth did not favour any variety. During the summer months Trojan appeared to be behind E.K.28 and Badila but it grew better in the autumn and early winter. The results are not yet sufficiently clear cut to indicate the superiority of either Trojan or E.K.28, and it will be necessary to examine the ratoon results before being able to assess the relative merits of the varieties under these conditions. The plant crop from the third portion of this trial was damaged by stock.

Mr. L. Galea's Farm, Alexandra, via Mackay.

Soil Type.—Old sandy alluvial. **Nature of Crop.**—Plant cane.
Age of Crop.—16 months. **Harvested.**—November, 1947.

SUMMARY OF CROP YIELDS.

Variety.	Cane per Acre.	C.C.S. in Cane.
	Tons.	Per cent.
Q.50	**31·6**	15·61
A.130	26·6	14·77
A.147	27·4	16·84
Q.28	26·7	15·48
Trojan	23·3	**17·84**
Q.44	20·7	15·55

Mr. C. G. Sommer's Farm, Palms, Mackay.

SUMMARY OF CROP YIELDS.

Variety.	Cane per Acre.	C.C.S. in Cane.
	Tons.	Per cent.
Q.50	**30·7**	**19·06**
A.130	29·7	15·10
A.147	27·4	17·79
Q.28	25·9	16·98
Trojan	26·3	17·91
Q.44	18·5	17·28

Mr. J. S. Russell's Farm, Balnagown, via Mackay.

SUMMARY OF CROP YIELDS.

Variety.	Cane per Acre.	C.C.S. in Cane.
	Tons.	Per cent.
Q.50	35·4	18·36
A.130	36·0	17·15
A.147	**36·6**	17·92
Q.28	32·7	17·41
Trojan	34·5	**18·66**
Q.44	31·3	15·48

SUMMARY OF RESULTS ON THREE FARMS.

Variety.	Average Cane per Acre.	Average C.C.S. in Cane.	Average Sugar per Acre.
	Tons.	Per cent.	Tons.
Q.50	**32·6**	17·68	**5·76**
A.130	30·8	15·67	4·86
A.147	30·5	17·52	5·35
Q.28	28·4	16·62	4·74
Trojan	28·1	**18.14**	5·11
Q.44	23·5	16·10	3·75

DISCUSSION.

There was little to choose between Q.50, Q.28, Trojan, and Q.44 in germinations, but A.130 and A.147 were not quite so good in any of the three trials. In the early months of development Q.50 and A.130 were the most forward in growth. A.147, although growing well, had a poor cover. Q.44 never looked impressive at any stage, but Trojan caught up considerably in autumn and early spring. It is a characteristic of this variety to make late growth when other varieties are slowing down under the influence of cooler conditions. The results indicate Q.50 and A.147 yielded more sugar per acre than any of the other varieties, with Trojan in third place. A.130, despite a good tonnage, again gave lower than average sugar content.

USEFUL WATER DATA.

1 inch of rain equals 22,622½ gallons per acre, and about 14,000,000 gallons per square mile.

1 inch of rain equals about 100 tons of water per acre.

1 inch of rain equals about ½ gallon of water per square foot.

1 inch of rain in a year falling on a square mile would yield, if stored, about 38,000 gallons per day.

1 cubic foot of water equals 6.23 gallons and weighs nearly 62½ lb. or 1,000 oz.

32 cubic feet of water weigh 1 short ton (2,000 lb.).

36 cubic feet of water weigh 1 long ton (2,240 lb.).

1 gallon of water weighs 10 lb.

224 gallons of water weigh 1 long ton.

The British Imperial gallon equals very nearly 1⅕ United States gallons.

1 gallon equals 4·5449 litres.

A column of water 1 foot high exerts a pressure of 0·433 lb. per square inch or 62.352 lb. per square foot.

Water containing the following grains of salt per gallon contains the indicated number of pounds of salt per acre inch:—

1 grain per gallon equals 3·23 lb. salt per acre inch.

5 grains per gallon equals 16·15 lb. salt per acre inch.

10 grains per gallon equals 32·3 lb. salt per acre inch.

20 grains per gallon equals 64·6 lb. salt per acre inch.

30 grains per gallon equals 96·9 lb. salt per acre inch.

40 grains per gallon equals 129·2 lb. salt per acre inch.

A five-inch watering applies the following amounts of salt per acre:—

1 grain per gallon equals 16·15 lb. of salt per acre.

5 grains per gallon equals 80·75 lb. of salt per acre.

10 grains per gallon equals 161·5 lb. of salt per acre.

20 grains per gallon equals 323·0 lb. of salt per acre.

30 grains per gallon equals 484·5 lb. of salt per acre.

40 grains per gallon equals 646·0 lb. of salt per acre.

N.J.K.

Legume Inoculation Pays.

THE accompanying photograph taken on the farm of H. Wittholz and Son, Maroochy River, Nambour, demonstrates the value of inoculating legume seed with the nitrogen-fixing bacteria.

A sample of the inoculated Blue Lupin seed was planted with adjacent samples of non-inoculated seed. Growth of the former can be seen as almost 12 inches above that of the latter. Production of foliage was far greater in the inoculated plants and it can be appreciated that the resultant yield of nitrogen was therefore much higher.

The results of this experiment were verified in the field where two blocks totalling 15 acres exhibited definite lines of demarcation in vigour and degree of greenness, between the treated and untreated seed.

FIG. 43.—The New Zealand Blue Lupin plants on the left were treated with a bacterial culture before planting, while those on the right were not treated.

Since green manuring is an established farm practice in the Moreton area, growers are urged to avail themselves of the opportunity to inoculate seed and ensure the presence of useful nitrogen fixers. A restricting factor to the successful work of the bacteria is acidity, and if this unfavourable state is thought to exist a simple test can be made by the local Bureau Officer and a lime recommendation made.

In ordering bottles of the bacteria culture advice should accompany the request, setting out the kind of legume to be inoculated, the amount, and the approximate date of planting. A charge of 1s., which may be covered by postage stamps, is made to defray cost of forwarding the culture. To assist in preparing the material for planting a sheet of instructions accompanies the inoculum.

N.Mc.D.S.

Quarter-Twist Belt Drive.

By J. H. NICKLIN.

OCCASIONALLY a grower who wants to install some power-driven machinery, such as an emery wheel or circular saw, finds that the layout of his engine is such that the new machine can only be placed in some position where it would be in his way, if driven by the usual belt drive from his power unit.

The quarter-twist belt drive would solve his problem in many cases by giving him further choice of sites for the new machine, and for this reason we now present particulars of this drive which is both simple and effective.

An example of the quarter-twist drive is to be seen at the Sugar Experiment Station, Mackay, where it was installed on a counter shaft which, driven by the irrigation engine, drives a small sampling mill, cane fibrator, and emery wheel. This installation permitted the three machines to be put into a small narrow shed without congesting the floor space, and has operated quite satisfactorily for more than ten years.

The important condition that must be satisfied with this type of drive is that the centre of the face of each pulley must be aligned with that face of the other pulley from which the belt leaves. When, with a vertical belt drive, a plumb line is hung over the falling side of the overhead pulley at the middle of its face, the line must touch the rising side of the lower pulley at the middle of its face.

Actually, of course, the drive need not be a quarter twist. So long as the condition mentioned is carried out the angle between the two pulleys may be anything from 0 degrees to 180 degrees.

In laying out the drive the only point to be watched is that, when looking down on the tops of the two pulleys, the arrow of direction of the top pulley must follow the arrow of direction of the lower pulley. The drawing shows the application of this rule to the four possible cases. In each case it must be understood that the belt passes over the top of the overhead pulley and thence to the far side of the pulley underneath.

Another example of this type of drive is an engine or horizontal electric motor belted to a vertical spindle pump.

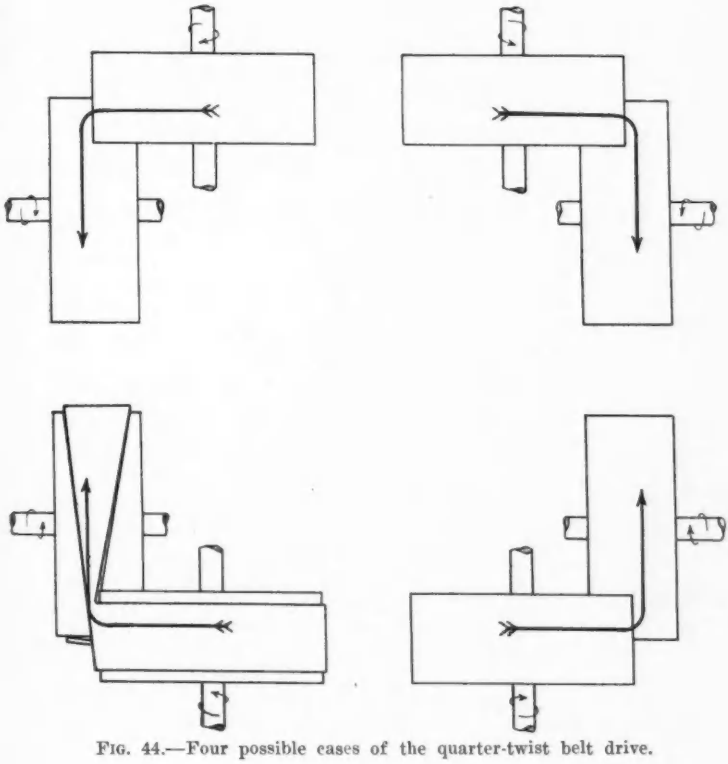

FIG. 44.—Four possible cases of the quarter-twist belt drive.

For a satisfactory drive the following points could be kept in mind—

1. The distance between the faces of the pulleys should be at least eight times the width of the belt.
2. Thin flexible belts are desirable.
3. Pulleys of about the same diameter give best results.
4. The drive is not reversible.

CORRECTION.

On page 88 of the Quarterly Bulletin for October, 1947, an error occurred in describing Figure 31. This description should read "female on left, male on right."

"The Sugar Experiment Stations Acts, 1900 to 1947."

List of Varieties of Sugar Cane Approved for Planting in 1948.

Department of Agriculture and Stock,
Brisbane, 3rd January, 1948.

Mossman Mill Area.

Badila, Cato, Clark's Seedling, Comus, D.1135, H.Q.409, Korpi, P.O.J.2878, Pompey, Q.10, Q.44, S.J.4, and Trojan.

Hambledon Mill Area.

Badila, Badila Seedling, Cato, Comus, D.1135, Eros, Pompey, Q.44, and Trojan.

Mulgrave Mill Area.

North of Fig Tree Creek.

Badila, Badila Seedling, B.147, Cato, Comus, D.1135, Eros, P.O.J.2878, Q.10, Q.44, and Trojan.

Babinda District.

Badila, Badila Seedling, B.147, Cato, Clark's Seedling, Comus, D.1135, Eros, Q.10, Q.44, and Trojan.

South of Russell River.

Badila, Badila Seedling, Clark's Seedling, Eros, Q.10, Q.44, S.J.4, and Trojan.

Babinda Mill Area.

Badila, Badila Seedling, B.147, Cato, Clark's Seedling, Comus, D.1135, Eros, Q.10, Q.44, and Trojan.

Goondi Mill Area.

Badila, Badila Seedling, Clark's Seedling, Eros, Pompey, Q.10, Q.44, S.J.4, and Trojan.

South Johnstone Mill Area.

Badila, Badila Seedling, Clark's Seedling, Eros, Q.10, Q.44, S.J.4, and Trojan.

Mourilyan Mill Area.

Badila, Badila Seedling, Clark's Seedling, Eros, Pompey, Q.2, Q.10, Q.44, S.J.4, and Trojan.

Tully Mill Area.

Badila, Badila Seedling, Clark's Seedling, Eros, Q.2, Q.10, Q.44, Q.813, and Trojan.

Macknade Mill Area.

Badila, Cato, Endor, Eros, H.Q.409, Orion, Pindar, P.O.J.2878, and Trojan.

Victoria Mill Area.

Badila, Cato, Endor, Eros, H.Q.409, Orion, Pindar, P.O.J.2878, and Trojan.

Invicta Mill Area.

North of Townsville.

Badila, Eros, H.Q.409, Nanemo, Oramboo, P.O.J.2725, Q.2, Q.10, Q.20, S.J.2, and Trojan. The variety Clark's Seedling may be planted only in the section south of Cattle Creek.

South of Townsville.

Badila, B.208, Clark's Seedling, E.K.28, P.O.J.2714, S.J.2, S.J.4, S.J.16, and Trojan.

Pioneer Mill Area.

Badila, B.208, Clark's Seedling, Comus, E.K.28, P.O.J.2878, S.J.2, S.J.4, S.J.16, and Trojan.

Kalamia Mill Area.

Badila, B.208, Clark's Seedling, Comus, E.K.28, P.O.J.2878, S.J.2, S.J.4, S.J. 16, and Trojan.

Inkerman Mill Area.

Badila, B.208, Clark's Seedling, Comus, E.K.28, P.O.J.2878, S.J.2, S.J.4, S.J.16, and Trojan.

Proserpine Mill Area.

Badila, Clark's Seedling, Co.290, Comus, E.K.28, M.1900 Seedling, P.O.J.2878, Q.28, Q.45, Q.50, Q.813, S.J.2, and Trojan.

Farleigh Mill Area.

Badila, Badila Seedling, Clark's Seedling, Co.290, Comus, D.1135, E.K.28, M.1900 Seedling, P.O.J.2725, P.O.J.2878, Q.28, Q.45, Q.50, S.J.2, and Trojan.

Racecourse Mill Area.

Badila, Badila Seedling, Clark's Seedling, Co.290, Comus, D.1135, E.K.28, M.1900 Seedling, P.O.J.2725, P.O.J.2878, Q.28, Q.45, Q.50, Q.813, S.J.2, and Trojan.

Pleystone Mill Area.

Badila, Badila Seedling, Clark's Seedling, Co.290, Comus, D.1135, E.K.28, M.1900 Seedling, P.O.J.2725, P.O.J.2878, Q.28, Q.45, Q.50, Q.813, S.J.2, and Trojan.

Marian Mill Area.

Badila, Badila Seedling, Clark's Seedling, Co.290, Comus, D.1135, E.K.28, M.1900 Seedling, P.O.J.2725, P.O.J.2878, Q.28, Q.45, Q.50, S.J.2, and Trojan.

Cattle Creek Mill Area.

Badila, Badila Seedling, Clark's Seedling, Co.290, Comus, D.1135, E.K.28, M.1900 Seedling, P.O.J.2725, P.O.J.2878, Q.28, Q.45, Q.50, S.J.2, and Trojan.

North Eton Mill Area.

Badila, Badila Seedling, Clark's Seedling, Co.290, Comus, D.1135, E.K.28, H.Q.285, M.1900 Seedling, P.O.J.2725, P.O.J.2878, Q.28, Q.45, Q.50, Q.813, S.J.2, and Trojan.

Plane Creek Mill Area.

Badila, Badila Seedling, Clark's Seedling, Co.290, Comus, D.1135, E.K.28, M.1900 Seedling, P.O.J.2714, P.O.J.2725, P.O.J.2878, Q.28, Q.45, Q.50, Q.813, S.J.2, and Trojan.

Bingera Mill Area.

C.P.29/116, Co.290, Mahona, P.O.J.2725, P.O.J.2878, Q.25, Q.28, Q.42, Q.47, Q.48, and Q.49.

Fairymead Mill Area.

C.P.29/116, Co.290, P.O.J.2878, Q.25, Q.28, Q.42, Q.47, Q.48, and Q.49.

Millaquin Mill Area.

C.P.29/116, Co.290, P.O.J.213, P.O.J.2878, Q.25, Q.28, Q.42, Q.47, Q.48, and Q.49.

Qunaba Mill Area.

C.P.29/116, Co.290, P.O.J.213, P.O.J.2878, Q.25, Q.28, Q.42, Q.47, Q.48, and Q.49.

Gin Gin Mill Area.

C.P.29/116, Co.290, Mahona, M.1900 Seedling, P.O.J.2878, Q.25, Q.42, Q.47, Q.48, Q.49, and Q.813.

Isis Mill Area.

C.P.29/116, Co.290, Co.301, P.O.J.213, P.O.J.2878, Q.25, Q.28, Q.42, Q.47, Q.48, and Q.49.

Maryborough Mill Area.

Pialba District.

C.P.29/116, Co.290, P.O.J.213, P.O.J.2878, Q.28, Q.42, and Q.813.

Maryborough District.

Brown Innes, C.P.29/116, Co.290, M.1900 Seedling, Oramboo, P.O.J.213, P.O.J.2878, Q.28, Q.42, and Q.813. Q.25 may be planted only on those farms loading cane at sidings on the North Coast Line from Mungar South.

Mount Bauple Mill Area.

C.P.29/116, Co.290, H.Q.285, M.1900 Seedling, P.O.J.213, P.O.J.2878, Q.25, Q.28, Q.42, and Q.813.

Moreton Mill Area.

Atlas, C.P.29/116, Co.290, P.O.J.2878, Q.28, Q.42, Q.47, Q.49, and Vesta.

Rocky Point Mill Area.

C.P.29/116, Co.290, H.Q.285, Oramboo, P.O.J.2878, and Q.813.

E. R. BEHNE.
Director of Sugar Experiment Stations.

PROCEDURE FOR TAKING SOIL SAMPLES.

It is essential to obtain a sample truly representative of the area under examination. The number of sub-samples which should be taken and mixed in order to obtain such a representative sample will depend on the apparent variability of the soil and size of the field. At least three samples should be taken and composited for the smallest area. For large areas at least one sub-sample per acre is required.

A post hole digger is one of the most convenient implements with which to sample the soil, as this removes a complete portion in one operation. An ordinary 1½ inch auger is good, provided the soil is sufficiently moist to cling to it firmly. If these implements are not available a square hole should be dug to a depth of 10 inches (plough depth) and after cleaning out the loose earth, a slice about 2 inches to 3 inches thick taken down one side from top to bottom. Such a sub-sample should then be placed on a clean bag or piece of canvas. Other sub-samples (of approximately similar weights) should be added to the first one on the canvas and all mixed thoroughly before making the final sample, which should approximate 2 lb.

Soils which appear markedly different must never be mixed, but each sampled for separate examination.

Notes should be recorded as to the type of sub-soil—e.g., sand, clay, &c.—and whether the area in question would be likely to benefit by artificial drainage, and these notes despatched, when the soil sample is forwarded, to The Director, Bureau of Sugar Experiment Stations, Department of Agriculture, Brisbane. Samples should be taken from the middle of the interspaces just prior to or immediately after harvesting the plant crop but before fertilization for the ratoon crop.

Fallow land should not be sampled except for special investigations.

L.G.V.

Velvet Beans for Green Manuring.

By NORMAN J. KING.

PRIOR to 1930 the principal green manure crops grown by cane farmers in the Bundaberg area were Mauritius bean, black cowpeas, and the clay-coloured giant cowpeas. The advent of Poona pea at about this period, with its reputation for vigorous growth and early maturity, was responsible for the almost complete disappearance of the Mauritius bean and black-seeded cowpea varieties. The clay-coloured giant cowpea has survived in the Isis area but is rarely seen growing on a large scale in the Bundaberg district.

The Mauritius bean (one of the velvet bean family) is characterised by excellent vigour, a long growing season, very heavy crop, and a dense mass of vine and leaf growth. It has a deeper and more extensive root system than the Poona pea and shows much less distress in dry periods. At the time when Poona pea came into favour the disadvantages claimed for the Mauritius bean were (*a*) difficulty in ploughing in the heavy vines and (*b*) the poorer early cover. At that time tractor ploughs and tandem disc harrows were not in common use as they are to-day, and a good Mauritius bean crop would probably be no obstacle to present day farm implements. The poor early cover of Mauritius bean was the result of the lighter seeding used with this large seeded species. Seed generally cost about £2 per bushel and was, in consequence, used sparingly. The most successful growers of this crop overcame this difficulty by planting in drills at the rate of 20 to 30 lb. per acre. This method economised on seed when compared with broadcast methods and allowed interspace scarifying on dirty land until runners met across the rows. With modern fast tractors and cultivators this job is done speedily and is amply repaid by the prevention of weed and grass seeding in the fallow.

In recent years growers in general are frankly critical of the Poona pea. Some go so far as to say that the characteristics of the crop have changed but all are agreed that its vigour and general performance are not what they used to be. Whether this is right or wrong is not the purpose of this article, but the impression is gained that a change in variety would be welcomed. Experience on the Bundaberg Station during the season of 1946-47 suggests that reversion to the growing of the velvet bean types may be the answer for the time being. The Director of Agriculture supplied to the Bureau small quantities of seed of six velvet bean varieties for field trial purposes. These varieties were Black Mauritius Q.1660, White Mauritius Q.1432, Marbilee Q.1744, Jubilack Q.1742, Smith Q.708, and Somerset Q.707. These were planted on the Bundaberg Station on 23rd September, 1946, in a block which had had a Poona pea crop the previous summer and had been bare fallowed since that time. The varieties were planted in drills 4 feet apart and each plot consisted of four rows 87 feet long. Four plots of each variety were planted. There was only fair soil moisture at planting time and germination did not take place until 99 points of rain fell on 27th October. At the same time volunteer Poona pea appeared on that portion of the block not planted with the trial, the seed being there from the previous crop. No further rain was recorded until mid-November when some three inches fell over a period of a week. This gave a good burst of growth but December

remained very dry and no useful rain fell again until an inch in mid-January. This two months without effective rain, in the middle of the hot weather, gave a severe check to the Poona pea. It ceased growing, wilted and began to flower as is its habit when checked. The velvet beans continued to make growth, threw out long vigorous runners and were not apparently distressed by the dry soil conditions. Growth continued normally with the good February and March rain and by late March flowers and young pods were noticed in all varieties, while the soil surface under the plants was covered with a thick litter of bean leaves.

Despite the lack of rain from mid-November to mid-January the beans had met across the interspaces and provided a good cover by early January. So vigorous was the growth that on three occasions the runners which were encroaching on the adjacent plots had to be cut and thrown back. In mid-April about 10 per cent. of each plot was cut off level with the ground and weighed so that the tonnage per acre of each plot could be obtained. The remainder was left for seed collection. The two bad germinators, Jubilack and Smith, were not weighed as their stand was so sparse, but seed was collected for further trial. The tonnages were as set out in Table I.

TABLE I.

GREEN HARVESTING WEIGHTS OF VELVET BEANS.

Variety.	Tons per acre.				Average.
	Plot 1.	Plot 2.	Plot 3.	Plot 4.	
White Mauritius	13·6	10·9	7·5	14·8	11·7
Black Mauritius	13·9	13·9	15·6	16·3	14·9
Somerset	13·4	13·6	13·6	15·6	14·1
Marbilee	15·8	16·5	17·3	17·5	16·8

Analyses of the dried material were made and the results are set out in Table II.

TABLE II.

ANALYSIS OF DRIED VELVET BEAN SAMPLES.

Laboratory Number.	A2690.	A2691.	A2692.	A2693.
Variety.	Black Mauritius Q1660.	Marbilee Q1774.	Somerset Q707.	White Mauritius Q1432.
	Per cent.	Per cent.	Per cent.	Per cent.
Total Organic Matter	87·71	88·01	88·98	88·34
Total Mineral Matter	8·12	8·34	7·97	7·84
Moisture	4·17	3·65	3·05	3·82
	100·00	100·00	100·00	100·00
Insoluble	0·40	0·36	0·42	0·44
Lime (CaO)	2·45	2·32	2·45	2·65
Magnesia (MgO)	1·05	0·97	0·89	0·84
Potash (K_2O)	0·42	0·43	0·41	0·36
Phosphate (P_2O_5)	0·41	0·38	0·45	0·43
Total Nitrogen	3·00	3·10	3·18	2·96
Protein (N x 6·25)	18·75	19·38	19·88	18·50

The nitrogen content of these crops is particularly good and, in the case of a 15 tons per acre yield, represents a gain to the soil of approximately 200 lb. per acre of nitrogen which is equivalent to 1,000 lb. of sulphate of ammonia. Even more important features of the velvet bean type of crop are the resistance to bean fly and wilt. The former is always likely to destroy Poona pea crops in any part of the sugar belt if conditions are favourable, while the latter causes severe losses in the wetter parts of the North. The drought resistance of velvet beans makes them a desirable type for all areas where soil moisture is likely to be a limiting factor in crop growth and the deep root system must have an ameliorating effect on subsoil conditions. Where land can be left under long fallow and not planted with cane until August or September the velvet beans are of particular value. The ground is covered from February onwards with a dense crop and the fallen leaves produce an excellent decomposing leaf mulch on the soil surface. It is this rotting surface material which assists in the development of a desirable soil texture, without which good planting tilth is unobtainable.

All seed from the six varieties of velvet beans mentioned above has been collected and will be replanted in spring 1948 under a range of conditions and soil types. As soon as the best is selected arrangements will be made to propagate seed stocks commercially so that the variety will be available to cane growers.

Sugar Experiment Stations Advisory Board.

The Sugar Experiment Stations Advisory Board met in the room of the Minister for Agriculture and Stock (the Hon. H. H. Collins) at Parliament House on Wednesday, 3rd December, 1947. The full Board was present consisting of the Minister (as Chairman), Messrs. J. W. Inverarity and J. C. Collier (millers' representatives), W. L. Poustie and L. G. Scotney (growers' representatives), and E. R. Behne (Director of Sugar Experiment Stations).

In discussing the staff position of the Bureau of Sugar Experiment Stations, the Board felt that in the interests of the industry selected members of the staff should be sent overseas for specialised training and experience. The possibility of action being taken along these lines was to be investigated immediately.

Arrangements for the tractor school to be held at Gatton College in January, 1948, were well in hand and already more applications had been received than could be accommodated.

Satisfaction was expressed at the degree of success obtained in the control of wireworms by means of "Gammexane." Due publicity would be given to the Bureau's recommendations in this regard in time for farmers to take the necessary measures to safeguard the 1948 plantings from this pest.

The importation of sugar cane varieties from overseas for trial in Queensland has been continued and in the past four months selections from U.S.A. and Mauritius have been placed in the field for propagation and test.

The rest of the business dealt with by the Board was mainly formal.

"Gammexane" for the Control of Wireworms.

By W. A. McDOUGALL.

THE promising work with "Gammexane" against wireworms carried out on small plots in the central districts during 1946 was repeated in large scale commercial trials during last spring. The photograph reproduced here shows a 4-row strip trial planted during early August, 1947, in wireworm country on an Oakenden farm. The "Gammexane"-treated rows are easily seen and this result is typical of all trials where the pests were active and the insecticide was used correctly. Last year's work allows us to make a definite and practical recommendation as the trials covered a number of conditions such as poor to good planting moisture, a number of soil types, different degrees of pest infestation, the application of lime before planting, varying soil cover, the rolling of drills after planting, and other agricultural practices.

The "Gammexane" was thoroughly mixed with several planting mixtures and meatworks fertilizer, and was applied in the drill at rates from fifteen to forty pounds of insecticide (10 per cent. dust, 1·3 per cent gamma isomer) per acre. *Twenty pounds per acre is the recommended application.* This, if properly applied, ensures good uniform results at a total cost for "Gammexane" of about £1 per acre; and at the same time makes allowances for the varying run of fertilizer through distributors under ordinary farm conditions. The mixing of "Gammexane" and fertilizers is definitely not a farm job. Therefore, when ordering "Gammexane"-fertilizer mixtures *the farmer should state the rate of application of drill mixture he intends to use.* For an application of three bags per acre, 6⅔ lb. of "Gammexane" will be added to each bag of fertilizer; if the application is 2 bags per acre then 10 lb. of the insecticide per bag of fertilizer will be required, and so on.

"Gammexane" in high concentrations affects cane root growth adversely. The objective is to place the material as close to the plants as possible, but at the same time to minimise possible contact with the roots. *The ideal placement of the "Gammexane"-fertilizer mixture is in a narrow band immediately above the plants.* This can be done by home-made attachments which will allow the mixture to fall on the plants about an inch in front of the "run-in" of soil on the plants. In practice it has been found better to run the insecticide-fertilizer mixture through the ordinary fertilizer chute onto and around the plants rather than have it too far away from the eyes to be protected.

The use of the "Gammexane"-fertilizer mixture will make possible the earlier planting of many fields. However, the use of this aid in wireworm control should not in any way lessen the drainage efforts in wireworm country.

Farmers are invited to discuss the use of "Gammexane" as a wireworm control with officers of the Bureau or of the Cane Pest and Disease Control Board since a considerable quantity of "Gammexane" is on order for Mackay. A fuller account of the work done will be published later, but in the meanwhile this short article will serve to direct the attention of farmers with wireworm country to this promising new insecticide.

FIG. 45.—August, 1947, plant cane at Oakenden. The four rows on the right were planted with a fertilizer—"Gammexane" dust mixture while those on the left received no "Gammexane."

Notes on Termites which Damage Sugar Cane in North Queensland.*

By J. H. BUZACOTT.

IT is a well known fact that on some farms in the Ayr district of Queensland, the Giant Termite, *Mastotermes darwiniensis*, is an important pest of sugar cane. This species is known to most field officers and is easily recognized on account of its large size. However, there are a number of smaller species which also attack sugar cane and although they generally are responsible for far less damage than the Giant Termite, nevertheless under certain conditions they prove troublesome pests.

Recently it came under the writer's notice that serious local damage to isolated plots of cane was being caused by a species of termite. It was disclosed that attempts had been made to reduce the damage by poisoning all visible termite mounds in the vicinity of the isolation plots. This proved entirely unsuccessful and the author's critical examination of specimens from the cane showed that the species involved was not a mound builder. Further investigation then showed that its nests or *termitaria* abounded in the neighbourhood, but were not ordinarily visible, as they were located just under the soil surface or under stones and logs. This illustration indicates the importance of an accurate determination of the species involved before instituting methods of control.

During the past thirty years several species of termites have been recorded as damaging sugar cane in North Queensland, but the records are scattered and, at least in some instances, there is some doubt as to the correct determination of the species involved. Since the publication in 1942 of "Termites from the Australian Region," by Hill [3] the task of the entomologist working on this group has been considerably simplified and it is now possible to identify species with a reasonable degree of accuracy. Accordingly, all references in the available literature have been sifted and an attempt is made in this paper to assign to the correct species those termites which are definitely known to attack cane in North Queensland. Short notes on each species are given and reference is made to an easy means of identification for the use of field officers.

Identification of Species.—For the purpose of identification the shape of the head and the size and shape of the mandibles of the soldier caste are usually sufficiently characteristic to distinguish the species. Little difficulty should be experienced if these characters are viewed with a hand lens of magnification ×20, and if some observations are made regarding the type of nest constructed. A little difficulty may be experienced at first in picking out specimens of the soldier caste. In some species, soldiers are conspicuous by their aggressiveness; in others, their habits are less obvious and in such cases they may usually be distinguished by the long mandibles with which soldiers of most species are provided. In addition, the soldiers of many species are considerably darker in colour than the workers, particularly in the head portion, which is frequently of a dark orange colour.

* Paper presented at the Innisfail Conference, Q.S.S.C.T., May, 1947.

Of the following species of termites which are recorded as attacking sugar cane in North Queensland, only one record is new, that of *Hamitermes latidens*. The other species have all been placed on record previously but often under either synonymous or wrong names.

Description of Species.

(1) *Mastotermes darwiniensis* Froggatt—a very large species of termite, confined to North Australia. It does not, however, occur in the wetter coastal areas, and as far as the Queensland sugar belt is concerned, it ranges only from Townsville to Mackay. *M darwiniensis* assumes considerable importance as a pest of sugar cane in the Ayr district, where in certain localities it causes serious damage. The termites completely hollow out stalks of standing sugar cane, leaving only a thin shell. Extensive references to this species and its attacks on sugar cane are made by Jarvis [6, 7, 9], Hill [3], and Buzacott [2].

As far as the identification of the species is concerned, its large size distinguishes it from all other species known to attack sugar cane. However, an additional simple means of identification is that specimens of the genus *Mastotermes* have five tarsi or joints in the lower portion of the legs, whereas all other termite genera have four.

(2) *Heterotermes paradoxus paradoxus* Froggatt. This species of termite has been recorded several times as attacking sugar cane. It appears to be confined to north and north-western Queensland and in the sugar-cane areas records are from Mackay, Home Hill, Innisfail, Babinda and Gordonvale. Its nests appear to be located underground and damage by the species is slight and confined to the setts. Damage to cane has been recorded by Hill [*loc. cit.*] without specifying the locality, and by the author, who has observed it damaging cane setts at Greenhill, near Gordonvale.

The soldier of *H. paradoxus* has a long rectangular-shaped head with long, smooth mandibles (Fig. 46 (1)). The left mandible has a large tooth at the base with a few small serrations alongside, whilst the antennae have 17 or 18 segments.

(3) *Coptotermes acinaciformis* Froggatt—a very common species which constructs a large mound with a hard exterior and an interior resembling compressed paper. Although it is very common in forest areas adjoining cane fields this termite rarely attacks cane. It has been recorded as damaging cane setts on a few occasions and at least once it was responsible for tunnelling grown sticks of cane at Aloomba in the Mulgrave area. The soldiers of *C. acinaciformis* have an orange coloured, rather pear-shaped head with smooth curved mandibles (Fig. 46 (2)), whilst there is a conspicuous short tube (frontal pore) on the anterior upper portion of the head. It is not an easy species to determine when identification is based solely on the head characteristics of the soldier caste but the presence of this type of soldier in the vicinity of typical *Coptotermes* mounds would indicate this species.

C. acinaciformis extends from North Queensland to Western Australia and has been recorded as damaging cane at Aloomba and Meringa. According to Hill [3] it commonly damages the lead sheathing of telephone cables in many of the southern portions of Australia, although this type of damage in North Queensland appears to be confined to the giant termite, *Mastotermes darwiniensis*. Damage to cane by *Coptotermes* is described by Jarvis [9, 11] and Buzacott [1].

(4) *Rhinotermes* (*Schedorhinotermes*) *intermedius seclusus* Hill is a species which ranges from North Queensland to northern New South Wales. Hill [*loc. cit.*] states that it attacks growing sugar cane. Of the termite species known to attack cane, this is the only one in which the soldier has strongly toothed mandibles. (Fig. 46 (3)).

(5) *Eutermes magnus* Froggatt is recorded by Jarvis [7, 8] under the synonym *E. vernoni* as damaging sugar cane at Meringa. This species is very widespread and since apparently only the one record has been made, the damage to cane was probably accidental. *E. magnus* constructs a low rounded mound. The soldiers have the characteristic beaked head of the *Eutermes* group (Fig. 46 (4)).

(6) *Eutermes pluvialis* Mjoberg. Jarvis [4, 5, 7] recorded the species *Eutermes fumigatus* as causing damage to sugar cane. Since there is no other record of the existence of this species in North Queensland, Hill [*loc. cit.*] considers that the species mentioned by Jarvis was possibly *Eutermes pluvialis* which was wrongly identified. However, the record is doubtful and the attack on sugar cane was probably purely incidental. It is, however, included here to make this list as complete as possible. The soldier greatly resembles that of *E. magnus*, but there are 12 segments in its antennae, whereas in the latter species there are 14 segments.

(7) *Hamitermes herbertensis* Mjoberg. This species is recorded by Hill [*loc. cit.*] as causing damage to sugar cane and was probably one of a number of specimens forwarded to him from Meringa for identification some years ago. From the diagram by Jarvis [4], it would appear that this is the species which was formerly identified by Froggatt as "*Termes meridionalis.*" This latter name is a synonym for *Hamitermes meridionalis*, but this species is almost certainly restricted to the Northern Territory and the *Termes meridionalis* of Jarvis is most probably *Hamitermes herbertensis*. The range of *H. herbertensis* is from North Queensland as far south as Home Hill, but records of damage to sugar cane by it are very rare. Whilst it does not appear to construct mounds, it commonly fills hollow timber with an earthy nest and sometimes builds earthy nests on the outside of stumps.

The head of the soldier of *H. herbertensis* is somewhat pear-shaped and there is a triangular-shaped tooth in the middle of each mandible (Fig. 46 (5)). The antennae have 15 segments of which the third is usually the smallest and the fourth longer than the fifth.

(8) *Hamitermes latidens* Mjoberg. This species was responsible for damage to odd cane setts in an isolation plot of sugar cane in forest country at Highleigh near Gordonvale during 1945 and 1946. This appears to be the first record of damage to sugar cane by the species. In addition it was found in some cane setts in an isolation plot in red volcanic soil at Greenhill, near Gordonvale. In the latter instance the major harmful species present was *Hamitermes obtusidens* (*q.v.*). *H. latidens* is a small species and the soldiers have strongly curved mandibles with a single projecting tooth of characteristic shape on each side of the inner curve (Fig. 46 (6)). The shape of the soldier's head is oval, whilst the antennae have 14 segments, of which the fourth is the shortest. In addition, the bodies of the workers are dark grey in colour in contrast to those of *H. obtusidens*, which are creamy white. Hill records the range of the species from the Alice River in the Cape York Peninsula to Bowen. It does not appear to construct termitaria above the ground.

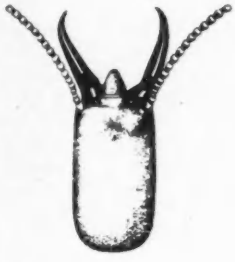

Fig 1

Fig 2

Fig 3

Fig 4

Fig 5

Fig 6

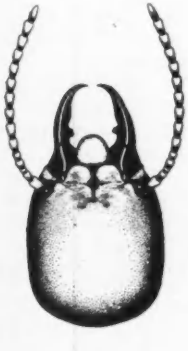

Fig 7

Fig 8

Fig 9

FIG. 46.—ILLUSTRATIONS OF THE HEAD OF THE SOLDIER CASTE OF VARIOUS SPECIES OF TERMITE. (After Hill.)

1. Heterotermes paradoxus paradoxus. 2. Coptotermes acinaciformis. 3. Rhinotermes intermedius seclusus. 4. Eutermes magnus. 5. Hamitermes herbertensis. 6. Hamitermes latidens. 7. Hamitermes obtusidens. 8. Mirotermes cheeli. 9. Microcerotermes serratus.

(9) *Hamitermes obtusidens* Mjoberg. This termite caused very serious damage to isolated plots of sugar cane at Greenhill, near Gordonvale, during both 1945 and 1946 seasons. These plots were in red volcanic soil and in the latter year practically every plant was destroyed. The writer's attention was first drawn to this damage by Mr. F. Barton, Field Chemist of the Colonial Sugar Refinery Coy., who submitted specimens of the termite for identification. *H. obtusidens* builds small nests ranging in size from little larger than the size of an apple to that of a small football. They are usually spherical in shape and are built just under the surface of the soil. Sometimes they are built under stones or logs, but quite a number of nests have been dug out from the soil where no log or stone is in proximity.

Specimens of *H. obtusidens* are small and the workers have a rather elongated abdomen of a creamy-white colour. Soldiers appear to be few in number and their mandibles each bear a single tooth on the inner side with an indentation above and below the tooth as shown in Fig. 46 (7)). Antennae of the soldiers have 15 segments, of which the third is very small.

(10) *Mirotermes cheeli* Mjoberg is a rather small species of termite which can be recognized by the very long, thin mandibles of the soldier (Fig. 46 (8)). This individual is capable of clicking these mandibles quite audibly and when living specimens are placed in spirit they usually click—or *crepitate*, to use the correct term.

Mirotermes cheeli is common near Gordonvale and on several occasions has been located in cane setts or stools; never, however, has it been known to cause serious damage. It builds small conical nests above ground which terminate in rather sharp points. The species is confined to North Queensland.

(11) *Microcerotermes serratus* Froggatt. On several occasions damage to cane setts by this species has been recorded. It occurs commonly in various parts of the Cairns district and it is recorded by Hill [*loc. cit.*] as being found in Queensland, Northern Territory and Western Australia. *Microcerotermes gladius* mentioned by Jarvis [11] is a synonym of *M. serratus*, as also is probably *M. taylori*. The soldiers are provided with long mandibles with fine serrations along the inner edge, whilst the head is elongated, with parallel sides (Fig. 46 (9)). *M. serratus* sometimes builds small dome-shaped nests and frequently builds subterranean ones.

(12) *Microcerotermes turneri* Froggatt strongly resembles *M. serratus*, and is recorded by Hill [*loc. cit.*] as damaging sugar cane. It is difficult to distinguish this species from *M. serratus*, and its nests are built on the ground, on trees, posts, &c., or even underground.

So far as is known the above list includes all the species of termites which have been recorded in literature as attacking sugar cane. There are, however, many references to attacks by termites in which no identification is given. It is probable that there are several species, other than those listed, which are responsible for such attacks. By reference to this paper it should be a comparatively easy matter for future investigators to determine whether any termite species found attacking sugar cane is a new record or not.

Acknowledgment.

Acknowledgment is made to Mr. G. F. Hill, from whose publication, "Termites from the Australian Region," the illustrations have been copied.

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The Varietal Revolution in the Ingham District.*

By C. G. HUGHES.

A PAPER [1] presented to the Technologists' Conference held last year at Bundaberg outlined in brief the remarkable changes which had taken place in the varietal picture in South Queensland. The graph reproduced there showed how the newer canes had supplanted the older varieties during the past few years. In a similar fashion, this present paper traces changes in the Ingham district although, of course, the varieties concerned are not the same.

The essence of progress anywhere is change but cane-farmers are generally fairly conservative and do not change varieties on a passing whim; frequently, there is the spectacle of a variety being grown as a leading cane for many years in the one area. Badila in North Queensland is an excellent illustration of this. This cane was first brought from New Guinea in 1896 and was soon grown extensively on the good soils in the wetter parts of the sugar belt. For many years past it has maintained itself as the leading cane in Queensland and usually yields a total tonnage more than twice as great as the

* Paper presented at the Innisfail Conference, Q.S.S.C.T., May, 1947.

next most popular cane. In the far northern areas, that is from the Burdekin to Mossman, Badila regularly yields well over fifty per cent. of the crop.

Even though the farmer does not willingly change his varieties when he has found that certain of them suit the conditions of his property, he is frequently forced to make changes by factors outside his control. Queensland farmers know only too well how frequently disease, or the threat of disease has caused a change in varieties. In the Mulgrave area, for instance, the presence of gumming disease only a few years ago led to the discarding of the very valuable S.J.4 and Clark's Seedling; these varieties are so susceptible to this disease that it would have been courting certain disaster to have persisted in their cultivation. At the present time the same varieties are going out in the Mossman area due to the same disease. There was an outbreak of gumming in the Rocky Point locality of that area in 1945 and the planting of these varieties was prohibited on and about diseased farms; last year the disease had spread further afield and so this year a larger area is involved in the planting restrictions. It will probably be only a few years before S.J.4 and Clark's Seedling will be gone from the area. These two canes were easily the most popular canes in the district and the change of varieties is a direct result of the disease. Gumming disease has also played a part in altering the varietal picture in other parts of Queensland as the losses caused by it have provided the chief incentive in a thorough search for newer, resistant canes. In the south, the importation of new canes such as P.O.J.2878 and Co.290 met the situation, while in the Ingham district the emphasis was on the production of new locally-bred seedlings. Many other countries besides Queensland have also had varietal changes forced upon them by disease or threat of disease in the crops.

Another factor often responsible, but not so obviously as disease, is the general lowering of soil fertility which usually takes place under Australian methods of farming. There have at times been lengthy controversies about the loss of fertility of our soils, but it is now generally conceded that our methods of agriculture, and particularly the harmful insistence on a mono-culture of sugar cane, have led to a marked deterioration in the quality and productiveness of the soil over large areas of coastal Queensland. The fallacy that all virgin soils are fertile soils has long ago been exposed but the fact remains that new soil being put under the plough for the first time, after thousands of years of undisturbed and gradual building up, possesses a structure and organic content which enables it to give better yields than it will in subsequent years after continuous cultivation. Experience has shown that certain varieties will grow quite well in this productive soil but as the years go on and more is taken from the soil than is put back, the yields from these varieties fall until a change becomes imperative. The new varieties do better than the old, but that is not to say that they would have done better when the soil was in its original fertile condition. Later, further soil deterioration forces another change and so on. It has been aptly said that new varieties, and fertilizers as well, are only temporary palliatives in arresting the deterioration of the soil.

Whatever the truth of this, the fact is that new varieties must be periodically injected into the sugar-cane culture if the industry is to remain reasonably stable.

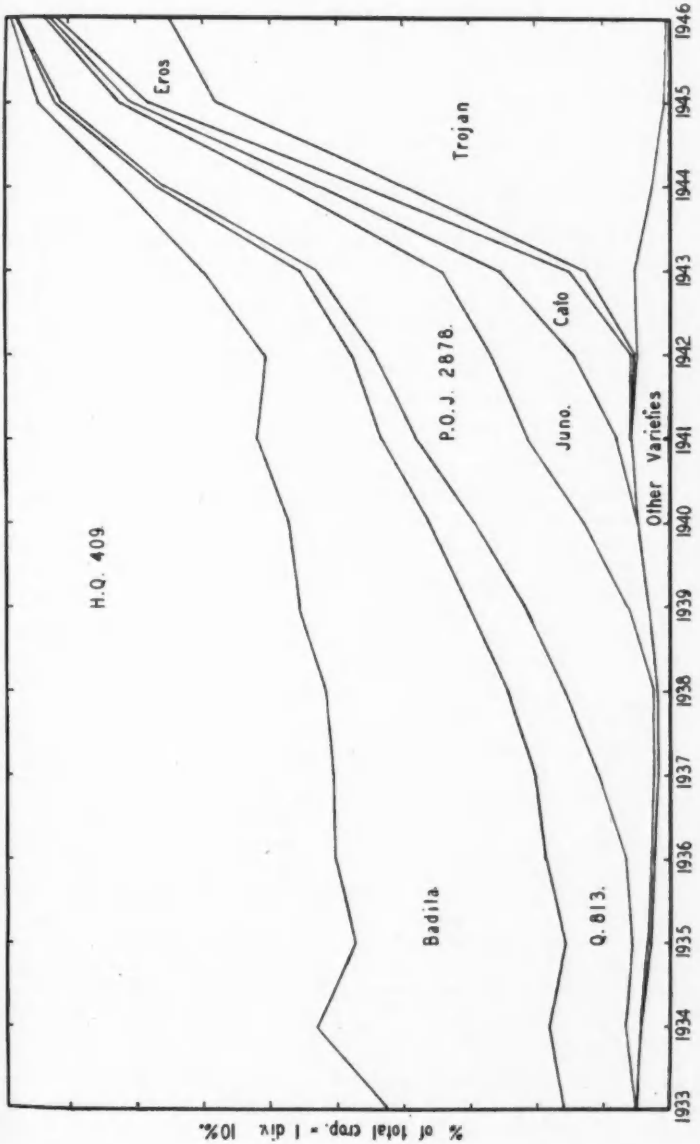

FIG. 47.—Illustrating the percentages of varieties harvested in the Ingham area, 1933 to 1946.

Within the last couple of years, and especially during the last few months, there has been considerable prominence given to the performances of two new varieties, Trojan and Eros, in the Herbert River district around Ingham, North Queensland. It is not intended to discuss here the merits and characteristics of these valuable new canes but merely to draw attention to the startling change which has occurred in the varietal scene at Ingham since their advent.

There are only two mills, Victoria and Macknade, in the area under discussion, but they happen to be two of the largest mills in Australia. Over the past ten seasons they have between them crushed an average of over 460,000 tons per annum, representing ten per cent. of the total Queensland crop. Varietal changes in such a productive district are of interest to everybody in the industry.

Fig. 47 illustrates in graphical form the percentage tonnages of varieties harvested in the Ingham district during the years 1933 to 1946 inclusive. The left-hand side of the diagram shows how important the three varieties, H.Q.409, Badila, and Q.813, were in the early years of the period with which we are dealing. In 1933, these three varieties yielded 95 per cent. of the crop harvested and even as recently as 1942 accounted for over 55 per cent. Last season these leading varieties of former days had dwindled to a mere 2.6 per cent., their total contribution being under 12,000 tons. In the middle portion of the diagram, i.e., in the years 1936 to 1943, we see Juno, P.O.J.2878, and Cato featuring fairly prominently. Juno rose to a maximum of 13.5 per cent. of the crop in 1941, but has dropped steadily since and now is a very minor variety. P.O.J.2878, the Javan "wonder" cane which has meant so much to South Queensland during the past few years, rose gradually from about two per cent. in 1934 to over 18 per cent. in 1943 and 1944, but during the last two years has shown a marked falling off; it yielded 19,000 tons of cane in 1946, but its decline has been so rapid that it is obvious there has been very little planting of this cane within the last few years. Cato reached a maximum of ten per cent. of the crop in 1943, but has since declined rapidly. Now moving across the diagram to the right-hand side the cause of the fading out and disappearance of the older canes is apparent; there is a sudden, dramatic increase in the percentage of the crop yielded by two new seedlings. Trojan and Eros, both bred by the Colonial Sugar Refining Company, have suddenly become major canes. In 1941, they were not even shown on the diagram; 1942, and 2,000 tons were put through the rollers; in 1943 they yielded nearly ten per cent. of the crop, with Trojan contributing about three times as much as Eros; 1944 figures, and the signs were plain for all to see, Trojan yielded 37 per cent. of the crop and Eros over six. Figures of 67 and 10 respectively for 1945 showed how popular these canes had become. Last year Trojan produced 74.7 per cent. of the Ingham district crop and Eros 16.7 per cent. These two new seedlings, produced as recently as 1933, have caused a complete change in the varietal position over the whole of the Ingham district and in 1946 between them contributed 91.4 per cent. of the crop or, to put it another way, 424,605 tons in 464,671. Such popularity in a district is not common in the Queensland industry and the 1946 Trojan figures for each of the two Ingham mills are larger than those for any other variety at any other mill.

The sudden rise in popularity of these canes is too recent to be seen in proper perspective, but, whatever their permanent place in the agriculture of the Herbert area, the fact remains that they are proving two very valuable varieties and the plant breeder of the Colonial Sugar Refining Company is to be congratulated upon selecting seedlings so suitable for the district.

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Notes on the Common Reed.

By N. McD. SMITH.

THIS plant, known as Reed Grass* and sometimes called Bluejoint Grass, Sword Grass, or Peashooter Grass, is widespread, and occurs along watercourses in the temperate to tropical zones of the world. From the banks of streams it has spread up the delivery ditches and secondary branches of drainage systems to cultivation in the Moreton area.

Its presence is always observed in an environment approaching marsh conditions, yet occasionally an isolated patch may be noted out of its normal surroundings. This can most likely be traced to filling being brought from a swamp or bank of a stream to build up a depression, in which case small portions of the underground runners have been included in the load. These runners are capable of producing shoots and constitute the major means of propagation as a careful check has not revealed any seedlings from the winter-blooming seed heads in the Moreton or Maryborough areas.

Some interesting facts about the Reed Grass concern its botanical name and uses made of the stem. It seems that the genera name of Phragmites is derived from the Greek "phragma = a fence" and no doubt refers to the fence-like growth habit of the plant.

In England the reeds are gathered and utilised as a thatching, some reports stating it will last for eighty years. In the better grown plants the stems were used as arrow shafts by the North American Indians and also the early English. In the latter country, before the introduction of quills, the stems were popular material for the making of pens.

As to its human food value, a reference states that the youngest shoots made an excellent ingredient for pickles.

Most of the cane-producing land of the Moreton is low lying and it is here that Reed Grass has assumed pest proportions. In the most part the nuisance lies not in the choking out of cane, but in harvesting operations, when the swordlike edges of the leaves inflict wounds on the legs and arms when loading. If cut off at ground level the stump can also inflict painful cuts to the unprotected feet of the unwary. Where cane blocks are situated bordering swamps, and inadequate drainage is provided the Reed is a difficult proposition to control, and in some cases has gained mastery over the cane and other weeds.

* *Phragmites communis.*

Spread is not readily noticed as the shoots hang fire for some time before making maximum growth. If in wet conditions, and left undisturbed, progress is rapid, which necessitates regular clearing of drains every year for this cause alone.

Propagation by means of notched underground runners makes eradication most difficult, and as a piece containing one eye will shoot the problem in relation to spraying is intensified. From the headland ditches the pest has been observed to spread into cultivation from

FIG. 48.—The flower head of the common reed grass.

portions of underground runners thrown out on the bank with sludge during cleaning. In one instance a ditch 6 feet deep was dug across a neck to shorten a creek and, at the bottom, cut ends of the Reed could be seen. Within two weeks each of these rhizomes had developed shoots of up to 6 inches long and gave indications of developing into a strong stand. The diggings from this ditch were covered with shoots within the two weeks, and patches where the soil had been carted to fill a hollow were showing indications of a future menace.

Chipping with a hand hoe or tearing and bruising with a scarifier will effect a temporary control until the cane can compete for sunlight. This is not an entirely satisfactory method as the operation promotes a stronger stool and breaking off of small subterranean pieces serves to spread the pest further along the row.

Spraying with the usual type of arsenical sprays has not been a success as, although the outer leaf sheath and leaves have been burned brown, the leaf spindle shoots again as the tight-fitting leaf sheath does not allow the material to penetrate down the stalk. A waxiness over all parts of the plant necessitates the use of a spreader for complete coverage. Chipping and spraying have not had a marked weakening effect as new shoots appear between treatments, and as the operation must be regular and short-spaced this cannot be carried out as part of the normal farm routine.

Apart from the arsenicals used there has been a trial with a chlorate type of weed killer, but without success.

By far the best means of control is feeding off with horses as they are able to nip the shoots off close to the ground. The young growth is palatable and, if convenient to work in with the farm rotation, a grazing period of 18 months to 2 years will effect eradication. For areas along ditches the problem is very difficult as fencing off and grazing such irregular areas is not always practicable, so that constant hoeing must be employed.

In the coming season some experimental work will be conducted on the possibilities of control, using the new hormone weedicides "Methoxone" and "2, 4-Di-weed" in conjunction with some of the well known chlorate type sprays such as "Atlacide."

A New Cane Lift.

By C. G. STORY.

A RECOGNIZED characteristic of the Australian farmer is his ingenuity, and his ability to improve on existing farm machinery. To the ranks of those who have helped in this respect may be added the name of Mr. D. Treacy, Mackay, who has invented and provisionally patented a device whereby the slow and laborious task of truck-to-tramway cane-loading may be facilitated. His method will fulfil a long felt want at this stage of the harvesting programme.

One costly and time-consuming job in the crushing season is cane loading under present conditions, where the cane is lifted from lorries to tramway trucks or railway waggons. The methods at present in current use are (*a*) the use of chain block or hoist driven by an endless chain which is generally manually operated, (*b*) the use of lifting tackle driven by a motor cycle or light engine, (*c*) an engine-operated endless-chain hoist, (*d*) the method in common use with railway cane (the horse-operated lift which uses the principle of capstan and bar). The new device, and one which should prove very popular, is operated by driving the rear wheels of a truck on two sets of rollers. The gantry consists of two heavy posts and one transom, the same as that used for the endless chain method. Two parallel axles, each with a roller at each end, are placed beneath and at right angles to the tramline; these are supported in plummer blocks mounted on a steel framework. The wheels of the truck rest between each pair of rollers and when the wheels are driven in second gear they set the rollers in motion. To the front driven axle is attached a small cogwheel, which meshes with and drives a larger toothed wheel which operates the winding drum. To this drum

FIG. 49.—Looking across the machine from the brake side.

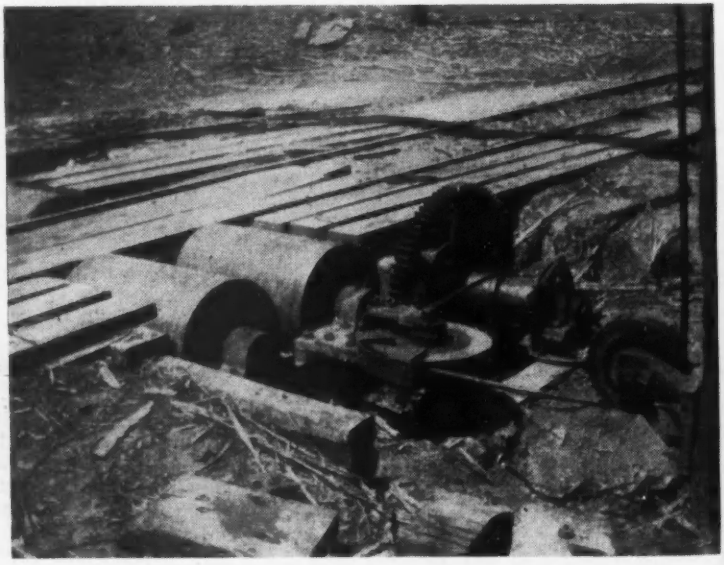

FIG. 50.—The winding gear showing two leading blocks, meshed cog-wheels, winding drum and one set of rollers.

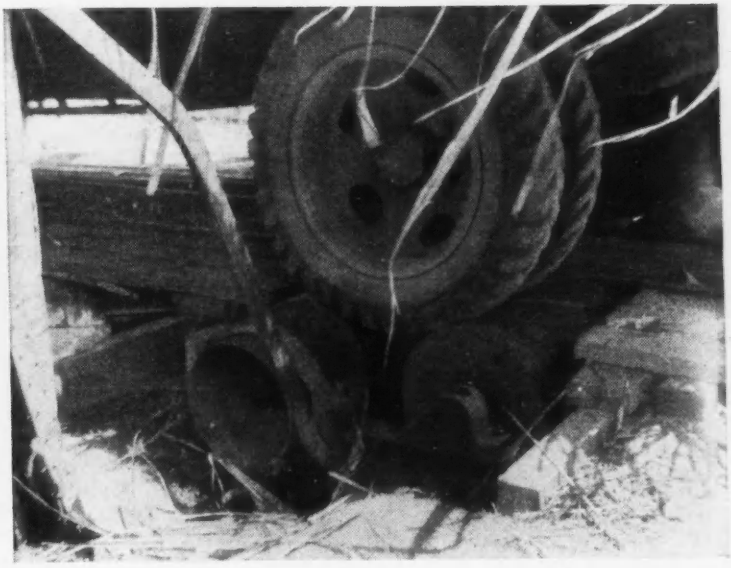

FIG. 51.—Wheels of truck in position to drive rollers.

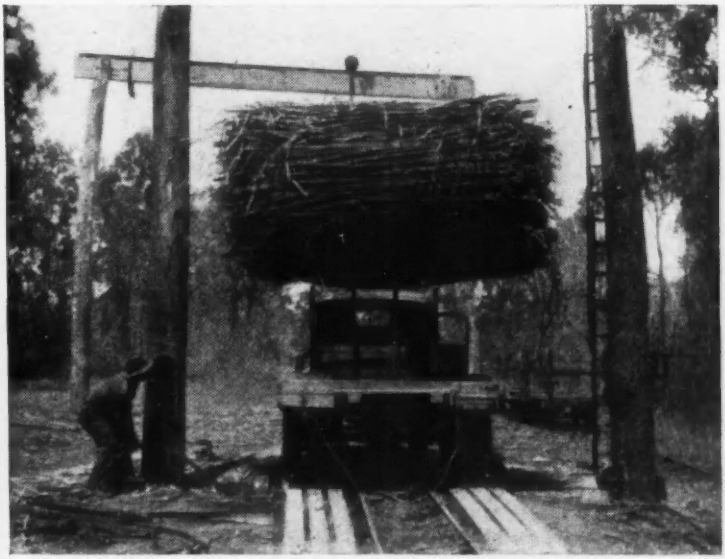

FIG. 52.—Applying the brake after the load is raised from the motor truck.

is attached a 2½-in. steel wire rope. To change the direction of the wire rope in order that the power may be favourably applied, two leading blocks, one horizontal and one vertical, are used near the base of one post. The rope passes through these two blocks then through two pulley wheels on the transom, one near the top of the post and the other in the middle of the transom, directly above the tramline where the load is to be lifted. The rope is then taken through a single block and the end made fast to a U-bolt on the transom. The wire slings around the load of cane are attached to the hook of the single block. As the large cogwheel is driven, the rope winds on its drum and the load is lifted by the wire rope, raising the single block. When the motor truck is removed, a sensitive brake holds the load in position and controls

FIG. 53.—Mill truck in position and load being lowered by means of the brake mechanism.

the lowering of the load when the tram truck is placed under it. The load can be lifted the required height in ten seconds, while the lorry driver may comfortably unload the lorry, load the tram truck ready for despatch, and leave the loading area within five minutes. There is no skidding between the rubber tyres of the lorry and the metal of the rollers even when the lorry is empty. Wet tyres and drums do not affect the friction; rollers may be turned with one's foot and there is no wear and tear on the lorries. Mechanical trouble should not arise owing to the small number of moving parts. The outfit readily handles 3 to 4 tons and could accommodate heavier loads. The drivers of the trucks using this lift appreciate its value and the old manually-operated endless-chain lift hangs idle, mute testimony to the more progressive, efficient and expeditious method of loading.

A. H. TUCKER, Government Printer, Brisbane.

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